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- **Brandenburg, Todd M.**  
**Kokomo, IN 46902 (US)**
- **Pervez, Rohail A.**  
**Kokomo, IN 46902 (US)**

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(71) Applicant: **Delphi Technologies, Inc.**  
**Troy, MI 48007 (US)**

(74) Representative: **Denton, Michael John**  
**Delphi European Headquarters,**  
**64, avenue de la Plaine de France,**  
**Paris Nord II,**  
**B.P. 60059, Tremblay en France**  
**95972 Roissy Charles de Gaulle Cédex (FR)**

(72) Inventors:

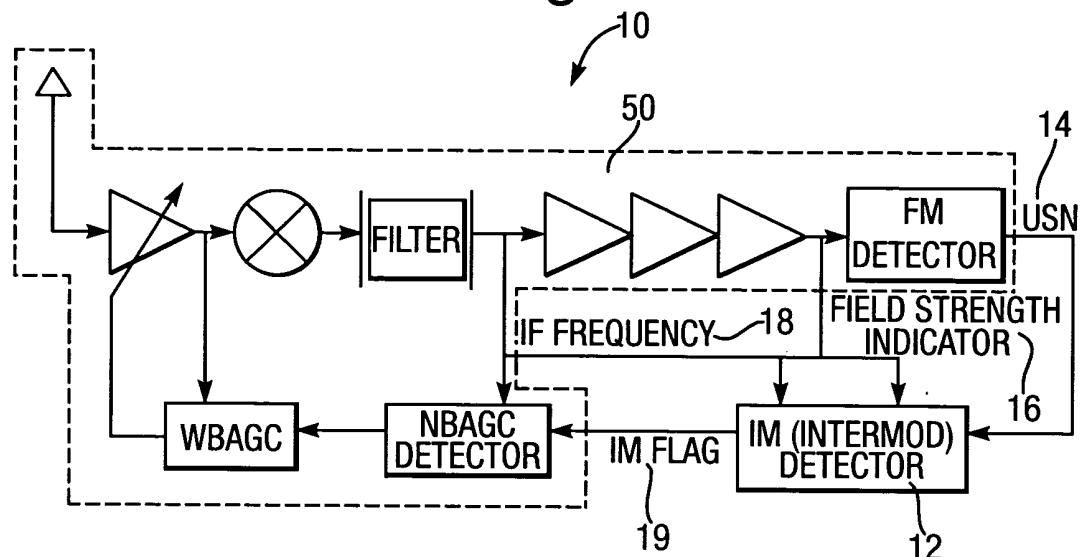
- **Marrah, Jeffrey J.**  
**Kokomo, IN 46901 (US)**

(54) **Enhanced automatic gain control**

(57) An automatic gain control circuit (10) that maximizes front-end signal attenuation is disclosed. The automatic gain control circuit (10) comprises a keyed automatic gain control circuit (50) and an intermodulation detector (12). The intermodulation detector (12) detects sig-

nal interference and generates an intermodulation detection flag (19). The keyed automatic gain control circuit (50) uses the intermodulation detection flag (19) to control front-end signal attenuation. A method for maximizing front-end signal attenuation for the automatic gain control circuit (10) is also disclosed.

**Fig.1.**



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# EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                             |                                                      |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                               | Relevant to claim                                    | CLASSIFICATION OF THE APPLICATION (IPC) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | JP 08 111648 A (MATSUSHITA ELECTRIC IND CO LTD) 30 April 1996 (1996-04-30)<br>* abstract; figures 1-5 *                                     | 1-15                                                 | INV.<br>H03G3/20<br>H03G3/30            |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | JP 01 170121 A (ALPS ELECTRIC CO LTD) 5 July 1989 (1989-07-05)<br>* abstract; figure 1 *                                                    | 1,4,6-15                                             |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                             | 2,3,5                                                |                                         |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 5 339 454 A (KUO YAO H [US] ET AL) 16 August 1994 (1994-08-16)<br>* abstract; figures 7-9 *<br>* column 2, line 7 - line 41 *            | 1,6-15                                               |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2001/021644 A1 (JANG YOUNG-GEUN [KR]) 13 September 2001 (2001-09-13)<br>* abstract; figure 4 *<br>* paragraphs [0009] - [0012], [0027] * | 1-15                                                 |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                             |                                                      | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                             |                                                      | H03G<br>H04B                            |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                             |                                                      |                                         |
| Place of search<br>Munich                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                             | Date of completion of the search<br>27 November 2006 | Examiner<br>Wichert, Beate              |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                             |                                                      |                                         |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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27-11-2006

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|----|---------------------|----------------------------|---------------------|
| JP 8111648                                | A  | 30-04-1996          | NONE                       |                     |
| JP 1170121                                | A  | 05-07-1989          | NONE                       |                     |
| US 5339454                                | A  | 16-08-1994          | NONE                       |                     |
| US 2001021644                             | A1 | 13-09-2001          | NONE                       |                     |